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SCIENCE POLICIES AND THE NEW INTERNATIONAL ORDER

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The new international political order has eroded the former bipolarity that was the mark of the postwar international system. Several cleavages within the Western and Eastern blocs, together with changes in the economic and political status of developing countries, have provided a much more complex system. The new context led to the disappearance of the former division of scientific and technological labor based on the dominance of the United States and the Soviet Union. Attempts to build some kind of "scientific internationalism" as an extension of the new international economic and political orders aspired to does not seem to have much future, as witnessed by the recent Vienna UN Conference on Science and Technology for Development. Several different national science policies seem, however, possible, and are briefly discussed, including policies of technological feats, alternative technologies, and comparative advantages.

The world order is changing, and this has consequences for the science policies of all countries. The aim of this article is to speculate about what these consequences might be. We shall briefly describe some general characteristics of the new world political order, and then discuss some of the options for the science policies of the developed countries, the underdeveloped or developing world, and the international community as such.

THE NEW INTERNATIONAL ORDER

The world in the 1980s is obviously very different from the world of twenty or thirty years ago. There have been profound changes in its two main axes—East-West, North-South—as well as within each of these four poles.

East-West relations have been profoundly disturbed by the gradual erosion of the bipolar system that was established after World War II. This erosion derived, in turn, from the cleavages and oppositions that emerged on both sides, as well as from the new role played by the so-called Third World countries in the international scene.

The Western pole has been transformed by the progressive erosion of U.S. leadership. Broadly speaking, the American military preponderance is in increasing contradiction to the country's relative loss of economic and political strength. The recovery of Europe, the new challenge of Japan, and of some of the new industrialized and oil-producing countries have led to deep transformations that escape American control. The crumbling of the dollar-based world monetary system, the independent dealings of the American allies with the East bloc, the OPEC countries and the Third World, and the perplexity of the American government in the crises that flare up in the underdeveloped world are all indications of this new situation. (It is difficult to believe that the attempts of the Reagan administration to re-establish the bipolarity of the 1950s will be successful in the long run.) In the East, the new event was obviously the emergence of China as a strong and independent actor in the world system, which introduced a kind of pluralism in the East that was unthinkable—except for the Yugoslav heresy—some decades ago. Pluralism in the East bloc has led to new and shifting coalitions and realignments among the world powers, which in turn provided much more room to maneuver for the underdeveloped countries than before.

Changes in the North-South axis have happened mainly along three lines. First, international conferences and institutions of all kinds—starting, of course, with the United Nations—have provided the grounds for an increasing challenge to the international dominance of the developed powers in these arenas of world politics. There is ample space to question the achievements of the Third World coalitions in substantive issues like the establishment of a New International Economic Order, but there is no denying that world politics cannot be managed any more through the dealings of the big powers and the support of their clients.

Second, the lines of cleavage in the South are becoming more confused and complex than ever. In the heyday of the Cold War, a country was in either the East or the West bloc, by internal choice or because of the constraints of a strict bipolar world. The Third World movement was an attempt to open space for other options, and it did it very successfully, although without creating a new coherent political bloc.

Third, a handful of the former underdeveloped countries are arriving at a stage of economic development where they can attempt independent

lines of international action. They are the so-called newly industrializing countries, on one hand, and the OPEC countries on the other.

In general, then, the new world political order is characterized by a much higher level of mobility and space for maneuvers and realignments than before, and by a relative loss of effectiveness in the ability of the big powers to control it, in spite of their continuing military hegemony. Does this situation affect the science policies of the individual countries? What are the different policy alternatives they can adopt? How do they vary from country to country?

INTERNATIONAL SCIENCE, SCIENTIFIC INTERNATIONALISM, AND SCIENTIFIC NATIONALISM

In the old, bipolar world, science and technology were almost by definition international. In the years after World War II, scientific and technological leadership was obviously in the hands of the United States and the Soviet Union, and in both systems it was more or less accepted that an international division of scientific and technological labor within each side was the only possible way. In the West, it was justified by the international nature of science, while in the East it came in the name of socialist solidarity. In either case, there was little room and few conditions for alternative policies.

The situation in recent years is obviously very different. The strengthened role of developing and poor countries in international organizations and conferences has led to some notion of what one could term a new and militant "scientific internationalism," similar in some ways to the internationalist political movements of the left. There are three assumptions that come together in this perspective. First, that science and technology developed by the rich countries in the North are biased toward their own interests, and should therefore not be adopted naively by the South. Second, that technology transfers between rich and poor countries tend to be usually detrimental to the latter, and to increase the asymmetry and dependency between rich and poor countries. A corollary of this is that technical transfers between poor countries, on the contrary, is healthy, and should be stimulated. Third, that the northern and rich countries are responsible for the asymmetries between North and South, and should compensate for this through massive transfers of resources to the poor. Moreover, these transfers

should be made on a multilateral basis, through the establishment of complex international organizations geared to this purpose. A new international scientific order should therefore emerge as part of a new international and political order in the making.

The acknowledged failure of the Vienna United Nations Conference on Science and Technology for Development in 1979 has shown that there is little room for this scenario to materialize. This kind of internationalism, however, is based on the assertion of the national interests of the southern countries, and in this sense is very close to what one could consider its opposite, that is, "scientific nationalism."

Once postwar reconstruction was complete, the European countries and Japan were able to reorganize their scientific establishments and create a revitalized technological infrastructure in tune with their new economic strength. Also, many developing countries have created sizable scientific communities through investments in higher education and fellowship and technical assistance programs that were intensified in the postwar years. Today, those that have achieved a minimum of industrialization or have amassed resources through oil exports are in a position to attempt to link their scientific potentials with their national policies. This is where "scientific nationalism" enters the scene.

"Scientific nationalism" is less an issue of epistemology (whether science is or is not ideologically conditioned, if there are one or several sciences according to national, class, and cultural differences, and so on) than a question of different emphases, priorities, and research and development policies. It means, quite simply, that countries decide to assume some responsibility for the ways scientific research and development is or is not being implemented in their territory, in an attempt to foster some values that go beyond those of scientific knowledge as such. It is possible to list some of the forms these science policies can take, and outline their more general implications.

A POLICY OF TECHNOLOGICAL FEATS

One of the most visible and widespread versions of scientific nationalism is the attempt to achieve some very significant technological feat, such as to place a man on the moon or, more commonly, to develop atomic energy or an atomic bomb. A technological feat of this kind has obvious political payoffs, both internally and internationally. For a few

countries, the development of atomic weapons has a clear military meaning; for the majority, however, it is only the secondary benefits that count.

It was once thought that, regardless of its ultimate objective, ambitious technological projects of this type would have beneficial effects on the country's scientific establishment and would generate a sizable impact from technological by-products that would benefit the society as a whole. There is no denying that the Apollo program and the British-French Concorde project, have resulted in more employment for scientists and technicians in the respective countries, making these careers more attractive. The technological spinoffs of a frontier project like the Apollo program, although subject to dispute, are certainly larger than the ones of the Indian or Brazilian atomic program, which can at most hope to replicate successfully the existing technologies. The social impacts of these programs are also different, and they depend, among other things, on the relative integration of the high technology program with the remainder of the country's economic, scientific, and educational institutions. This integration is at its highest in the United States or France, and at its lowest in India, China, or Brazil. In these countries, scientific policies aimed at technological feats can easily mean the creation of artificial and isolated scientific and technological institutions with little impact in the surrounding society and with little chance for self-reproduction and expansion, and at staggering costs.

POLICIES OF ALTERNATIVE, INTERMEDIATE TECHNOLOGIES

The difficulties and unwanted side effects created by the complex, energy- and capital-intensive technologies have led to the emergence of a whole new literature on alternative, soft, intermediate or labor-intensive technologies. These new technologies are supported and proclaimed by militant groups related to the ecological and back-to-nature movements in the developed countries, and are also presented as the best solution for the technological problems of the underdeveloped world. Alternative technologies could be created, according to this reasoning, in tune with the natural resources and the social and economic mores of the poor countries' populations, and would provide for a much more

harmonious and integrated development than that which is promised by the conventional technologies of the developed world.

The fact is, however, that this new approach has received much more support in some international agencies and in the developed countries than in the developing world as such. In the latter, intermediate technologies are often perceived as second-class technologies. The efforts of scientists and international policymakers to convince the developing countries to adopt them tend to be interpreted as attempts to keep these countries in a second- or third-class place in the world system, and to deny them the benefits the developed countries enjoy.

The opposition of these two extremes, the policy of technological feats and the policy of alternative technologies, usually reflects clashes between different groups within the countries and in the international community. In the more developed countries, policies of heavy investments in modern technology tend to find support among the trade unions and other sectors that can derive employment and other benefits from them. They are opposed by a growing group of educated citizens, usually unrelated to the scientific and industrial establishment, that see no more benefits arising from continuous technological progress and feel it threatens their lifestyle.

In the less developed countries, the policies of technological feats tend to be carried on in isolation and with the exclusion of the local university and academic establishment, which often generates strong resistance. Usually, however, this is a conflict about means, procedures, and access, and not about fundamental goals and objectives. No basic opposition comes from the poorer sectors of the countries' populations. These sectors tend to be already too involved in the rising expectations generated by modern industrial society, and too deprived to care about long-term problems like air pollution, environmental damage, or long-range health effects of modern technology.

Alternative technologies tend to fail at the onset for lack of support, while many attempts of technological feats of smaller and poorer countries tend to fail because of sheer cost, technological complexity, and lack of meaningful social and economic consequences.

POLICIES OF COMPARATIVE ADVANTAGE

A third, and often more successful, policy line substitutes new versions of the old notions of comparative advantage and international

division of labor, which make use of the fissures and contradictions generated by the current world political system. This is not, therefore, a question of strictly economic and technical advantages, but implies very definitive geopolitical and historical factors that preclude the exclusive operation of market forces.

One strategy, adopted by several of the newly industrializing countries, is to stimulate technology and capital transfer from the developed countries, and then to try to nationalize them. This is made possible, among other reasons, by the competition that exists among the different developed countries and their corporations, leading them to bid against each other for concessions in terms of technological transfers and long-term control of local industries. Socialist countries have also learned that they can invite large capitalist corporations to work in their territories and to effect a meaningful transfer of know-how and control to the local people. The comparative advantages some of these countries can offer to the corporations are cheap and skilled labor, long-range contracts, and eventually, political stability. It is certainly not by chance that this strategy tends to be more successful in countries where political life is strongly curtailed.

The production of weapons for the international market has also opened the way for some successful strategies. Relatively small countries with advanced technological capabilities can specialize in the production of a few products and find good customers in the oil-rich countries or in regional alliances. Also, the oil crunch is allowing for several attempts at alternative technologies, such as the alcohol program in Brazil or the synthetic fuel industry in South Africa. Again, so far there are few signs that the energy crisis is leading to a search for less energy-intensive technologies.

Finally, it is important to note that this strategy usually implies the adoption of established technologies, and although they can have important economic consequences, they do not necessarily increase the country's scientific and technological potential.

CONCLUSION

The new international order provides a much more flexible and unpredictable environment in which new versions of science policies can emerge. Two extreme possibilities, policies based on large technological feats and policies based on alternative or intermediate technologies,

have doubtful long-range possibilities. More short-range, opportunistic use of comparative advantages is being adopted, sometimes successfully, by some smaller and less developed countries. A better evaluation of these alternatives is awaited. They seem, however, to provide for a much more diversified and contradictory picture than what we had before in a context of enhanced international instability. If this picture is true, it means that the international division of labor in science and technology is something from the past, and is not likely to be replaced by a new kind of scientific internationalism that would flow from a new international political order.

REFERENCES

- ANNESTEDT, J. (n.d.) On the Present Distribution of R & D Resources. Vienna: Vienna Institute for Development. Occasional Paper 79/1.
- BEN-DAVID, J. and S. KATZ (1975) "Scientific research and scientific innovation in Israel." *Minerva* 13, 2.
- DORFER, I. N. H. (1974) "Science and technology in Sweden: the Fabians vs. Europe." *Research Policy* 3: 134-155.
- CHAUDHURI, B. D. (1975) "Indian science policy in the perspective of world science." *India Quarterly* 31 (December).
- HABER, J. (1972) "Politicalization of science." *Science* 178, 4062.
- MURRAY, D., Jr. (1976) "Technical communities and political choice." *Minerva* 14, 2.
- SALOMON, J. J. (1972) "Science policy and its myths." *Public Policy* 1.
- THOMAS, J. R. and U. M. KRUSE-VAICIENNE (1977) *Soviet Science and Technology - Domestic and Foreign Perspectives*, Washington, DC: National Science Foundation.
- WADE, N. (1975) "Third world: science and technology contribute feebly to development." *Science* 189, 4205.
- WIONCZEK, M. S. (1979) "The debate on the New International Economic Order and the development of the third world." Presented at the 29th Pugwash Conference, Mexico City.

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